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Background Paper

**Global Value Chains and Clusters in LDCs: What Prospects
for Upgrading and Technological Capabilities**

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"Upgrading" is buzz-word that is increasingly used in policy-related discussions. The word and its use reveals a clear and justified need to move beyond the pursuance of only higher production efficiency. Business scholars use this word extensively (Porter, 1990), economists are more reluctant, and prefer to follow the principle of specialization and comparative advantage, focusing their attention on production efficiency. However, given the existence of imperfections and extra-normal rents in international markets, and considering the different dynamic learning opportunities offered by different sectors and management functions, the idea of upgrading to newer sectors and functions is indeed appealing. However, most of the literature lacks clarity on this concept. Another branch of literature exploits the concept of technological capabilities (TCs) to explain enterprise learning and competitiveness in developing countries.

This paper will explore and discuss how different forms of industrial organization, and in particular clusters and especially value chains, may affect upgrading, technological capabilities and competitiveness in small and medium-sized enterprises in the Least Developed Countries (LDCs). Policy implications will be derived on the basis of the theoretical analysis and of the empirical evidence presented.

A. Upgrading, technological capabilities and competitiveness

1. Synonymous or different concepts?

The concept of "upgrading" has its origin in international trade theory, and in studies on the dynamics of countries' specialization it is used to indicate a shift towards a specialization in higher value-added goods within the same sector. This is different from diversification, i.e. specialization in new areas of comparative advantage in different sectors (Guerrieri, et al., 2003). However, this notion hardly translates into a useful definition at the firm-level, and it does not reflect the current use of this term in most economics and management literature.¹

The concept of upgrading has also often been used in studies on competitiveness and value chains (Kaplinsky, 2000) and is related to innovation. Enterprises may upgrade in various ways, such as by entering higher-unit-value market niches or new sectors or by undertaking new productive (or service) functions. Four types of upgrading have been distinguished for enterprises within a value chain (Humphrey and Schmitz, 2000).

¹ In this literature, the use of this concept clearly has its merits, as it represents a useful sophistication from the mere notion of production efficiency, to include product diversification, the acquisition of new skills and capabilities for different functions and even sectors, and so on (Porter, 1990).

- *Process upgrading* is transforming inputs into outputs more efficiently by reorganizing the production system or introducing superior technology.
- *Product upgrading* is moving into more sophisticated product lines in terms of increased unit values.
- *Functional upgrading* is acquiring new, superior functions in the chain, such as design or marketing, or abandoning existing lower-value-added functions, to focus on higher-value-added activities.
- *Intersectoral upgrading* is applying the competence acquired in a particular function to move into a new sector.

However, it has been noticed that in many studies the concept of upgrading often appears too fuzzy and suffers from some logical contradiction: is it a synonym for innovation, or is it rather the outcome of an innovation process?² The two concepts frequently overlap, but the innovation process itself is never directly investigated in this literature.³ In an effort to overcome these (potential) contradictions, Pietrobelli and Rabellotti (2004, 2006a) define upgrading as innovating to increase value added. Indeed, the study of innovation in developing countries may greatly benefit from the approach developed by the branch of literature that focuses on Technological Capabilities (TCs), convincingly showing that the level and depth of TCs affect local firms' industrial and innovation performance.⁴

A vivid way to illustrate this concept has led several authors to write that upgrading within a value chain implies "going up the value ladder", moving away from activities in which competition is of the "low road" type and entry barriers are low. However, although this description is certainly stunning and eye-catching, and offers some advantages, it is not very accurate. Global value chains (GVCs) are hardly so linear as they are often described (see below); indeed, this assumed linearity – often for the sake of simplifying their description – drives the attention away from all the detailed and equally important efforts to build and deepen TCs at the same stage of the value chain.

Certainly, a large part of the literature points to the idea that "functional" upgrading is "more optimal" than other forms of upgrading. However, we argue that the key issue is not always "functionally upgrading" and moving into more advanced functions "along the value chain", but often deepening the specific capabilities required to explore new opportunities offered "on the side" of the stage of the value

² An exception is in Kaplinsky and Morris (2001:37), where: "the concept of upgrading (*as distinct from innovation*) explicitly recognizes relative endowments, and hence the existence of rent. Thus, innovation has to be placed in a relative context – how fast compared to competitors – and this is a process, which can be referred to as one of upgrading."

³ See Morrison, et al. (2006) for a detailed discussion of these issues.

⁴ For an introduction to this approach, see Bell and Pavitt (1995), Dahlman, et al. (1987), Figueiredo (2001, 2006), Lall (1992, 2001) and Pietrobelli (1997).

chain where the firm is currently engaged. Moving from natural resources to their exploitation, manufacturing, packaging, distribution and branding is very important and can be described as somehow "climbing the ladder". But deepening capabilities to explore new original features and varieties "horizontally" at each stage of the GVCs (e.g. from new flower varieties via biotechnological research to new packaging with original highly-valued characteristics) is indeed also important, and clearly requires creation and deepening of higher skills and more complex TCs.⁵

Consistently with this interpretation of upgrading, that encompasses the notion of TCs, there is also evidence that – at least for new (subordinate) players such as suppliers in developing countries – there are equally or more profitable positions available within value chains, and other possible forms of upgrading. For example, this is suggested by Sturgeon (2002) in the computer sector, with contract manufacturers that may develop a highly profitable core competence that can be used across a diversified customer base within the sub-sector of origin and also across different sub-sectors.

Although Sturgeon's evidence is specific to the computers' sector, it reveals the existence of a more general opportunity for developing countries' firms that is related to the development and strengthening of TCs. Indeed, in the empirical GVC literature (see below), the idea that "technological change is the result of purposeful, well-directed effort conducted inside the firm" (Pietrobelli, 1997: 4) is often implicit in theoretical discussions, but nearly absent in most of the empirical analyses. In most of these studies it is hardly explored what occurs within firms, what makes firms differ even if they belong to the same sector or the same cluster, and how firm-level efforts to develop TCs have added to (or compensated for the lack of) the opportunities offered by GVCs. This is very relevant and will need to be explored in future analyses.

B. The least developed countries (LDCs)

The group of least developed countries (LDCs) is defined by the United Nations through a statistical procedure to identify the countries needing most international support (UNCTAD: Table 2.1). To the aim of discussing the opportunities for these countries of the new forms of industrial organization that are emerging worldwide, it is useful to briefly review their main common economic features:

⁵ This view is consistent and provides a microeconomic ground for the newly-emerging approach that describes economic development as a process of "self-discovery" (Hausmann and Rodrik, 2003), where the diversification of the productive structure through a process of discovery, often supported by new forms of industrial policy, plays a central role.

- Lower GDP pc (\$349 in 2004): all developing countries were at \$1,604 and developed market economies at \$32,732;

Table 2.1
List of the least developed countries (LDCs) –
UN definition (2006)

1	Afghanistan	26	Madagascar
2	Angola	27	Malawi
3	Bangladesh	28	Maldives
4	Benin	29	Mali
5	Bhutan	30	Mauritania
6	Burkina Faso	31	Mozambique
7	Burundi	32	Myanmar
8	Cambodia	33	Nepal
9	Cape Verde	34	Niger
10	Central African Rep.	35	Rwanda
11	Chad	36	Samoa
12	Comoros	37	S.Tomé & Principe
13	Congo, Dem. Rep.	38	Senegal
14	Djibouti	39	Sierra Leone
15	Equatorial Guinea	40	Solomon Islands
16	Eritrea	41	Somalia
17	Ethiopia	42	Sudan
18	Gambia, The	43	Tanzania
19	Guinea	44	Timor-Leste
20	Guinea-Bissau	45	Togo
21	Haiti	46	Uganda
22	Kiribati	47	Vanuatu
23	Lao PDR	48	Yemen, Rep.
24	Lesotho	49	Zambia
25	Liberia		

- They have been growing faster since 2000 (+2.5 per cent in the period 2000–2004) (2 per cent in all developing countries, 1.3 per cent in developed market economies), but always at lower growth rates during the 1980s (-0.1 instead of 1.1 and 2.6) and the 1990s (0.9 instead of 3.1 and 1.9) — and with faster population rates;
- They have a smaller share of urban population than in all developing countries;
- They have worse human development indices and components — higher infant mortality, lower life expectancy at birth: -51 in 2004, up from 49 in 1990, but lower than developing countries' 61 and 64. They also have worse health, nutrition and sanitation indicators;
- They have worse information and knowledge infrastructures (16 cellular subscribers and 4 Internet users out of 1,000 inhabitants (134 and 53 respectively in all developing countries), and worse energy and transport infrastructures;
- Human capital is also very poor;

- They rely on agriculture to a larger extent than all developing countries (69 per cent of population and 28 per cent of GDP – instead of 51 per cent and 11 per cent respectively), but they have recorded lower growth rates of total food production; and

Table 2.2 Leading LDCs Exports (2002–2003)				
Ranked as a percentage of developing countries' exports				
		As a % of	Value *	
SITC		Developing countries'	World's	USD (in millions)
263	Cotton	37.67	12.86	1 049.4
247	Other wood, rough squared	29.89	6.77	501.4
121	Tobacco, unprocessed	12.07	6.24	337.2
844	Undergarments of tex. fabrics	11.58	8.78	1 021.5
036	Crustaceans & molluscs (fresh, frozen, salted)	8.11	5.20	902.2
071	Coffee and coffee substitutes	7.59	4.71	427.4
892	Printed matter	7.51	1.21	422.7
842	Outer men garments of tex. fabrics	6.59	4.00	1,465.7
333	Petroleum oils	4.66	3.33	12,041.8
842 -6	Garments (various)			7,263.6

Source: UNCTAD (processed from UN Trade Statistics).
* Annual average 2002–2003.

- Very small manufacturing sectors: A stable 11–12 per cent share of GDP, with growth rates accelerating recently (2.9 per cent in the 1980s; 4.8 per cent in the 1990s; and 5.4 per cent during 2000–2003). This is not surprising, however, given the very unfavourable conditions for industrial and manufacturing development.

Interestingly, their international specialization reflects some of the structural conditions described above, with a clear specialization in oil, agricultural and natural resource-based products, and very simple manufacturing such as garments. However, the sum of the various types of garments (SITC, 842 to 6) amounts to an impressive \$7,263.600, that is more than half the value of LDCs' oil exports, and equivalent to 29 per cent of all their non-oil exported commodities (and 19.5 per cent of all their exports).

This implies that our present analysis of the potential for upgrading and competitiveness through participation in clusters and value chains needs essentially to focus on few sectors, such as agriculture, agro-industry and simple manufacturing (e.g. garments and furniture).

C. Clusters, (global) value chains and sector specificities affect upgrading and technological capabilities

This section briefly discusses how clusters and GVCs affect the process of upgrading and TC development in local firms in developing countries. This is achieved by discussing the essential theoretical elements, and by presenting some selected and relevant evidence.

1. Clusters

During the 1990s, a new approach to small-scale industry in developing countries has been stimulated by the successful performance of the industrial districts in the developed world, particularly in Italy. The ability of clustered firms to be economically viable and to contribute strongly to the growth process in industrial districts has attracted a great deal of interest in development studies (see, among the many, Nadvi and Schmitz, 1999).

However, the existence of a critical mass of specialized and agglomerated activities, even with strong historical roots, does not necessarily imply that these clusters also share *all* of the other characteristics that identify the Marshallian type of district. Indeed, most clusters in LDCs only share some of these elements, and often at an incipient stage.⁶ Nevertheless, clustering can be considered a major facilitating factor for a number of subsequent developments (which may or may not occur), including division of labour and specialization, the emergence of a wide network of suppliers, the appearance of agents who sell to distant national and international markets, the emergence of specialized producer services, the emergence of a pool of specialized and skilled workers, and the formation of business associations. To capture the positive impacts of these characteristics on the competitiveness of firms located in clusters, Schmitz (1995) introduced the concept of *collective efficiency*, defined as the competitive advantage derived from local external economies and joint actions.

External economies are (positive or negative) unpaid, out-of-the-market-rules side effects of the activity of one economic agent on other agents. The most common

⁶ Reviews of clusters support this statement: Oyelaran-Oyeyinka and McCormick (2007); McCormick (1999); Albaladejo (2001); and Pietrobelli, Rabellotti, and Giuliani in Pietrobelli and Rabellotti (2006).

external economies in clusters are the creation of a market for specialized skilled labour; the creation of a market for inputs, machinery, and specialized inputs (increased availability; competition on price, quality and service), allowing a fine division of labour; improved market access; and easy access to specialized knowledge about technologies and markets and rapid dissemination of information.

However, although incidental external economies are important in explaining clusters' competitiveness, a deliberate force is also at work, namely, consciously pursued *joint action* (Nadvi, 1999), that may include backward ties with suppliers and subcontractors and forward ties with traders and buyers, or within bilateral horizontal linkages between two or more local producers, through joint marketing of products, joint purchase of inputs, order sharing, common use of specialized equipment, joint product development, and exchange of expertise and market information.

Few detailed analyses of clusters in LDCs exist in the literature. A noteworthy exception on Sub-Saharan Africa is the work by Oyelaran-Oyeyinka and McCormick (2007), who present evidence on several African clusters, and suggest that, although they are all geographically and sectorally bounded groups of producers, they are far from being identical: some are continuously learning and innovating, while others appear to be trapped in a pattern of poor markets, low-quality products, and lack of imagination.⁷

The Otigba computer cluster in Nigeria is an excellent example of fast-growing "spontaneous" cluster that seems to have thrived with little government support. Indeed, the strength of the cluster appears the very early emergence of a private association of highly educated entrepreneurs of component suppliers, buyers, clone builders, and parts and components traders (Oyelaran-Oyeyinka, 2007).

Interesting examples of joint actions — that are always harder to develop than (passive) external economies — have also been detected in SSA clusters (Oyelaran-Oyeyinka and McCormick, 2007). The most basic were subcontracting, collaboration and the sharing of information. However, joint action in Otigba took the form of inter-firm credit facilities, technical support, knowledge sharing and joint warehousing of goods. These processes were clearly fostered by the action of the local private business association.

The case of the KwaZulu-Natal Benchmarking Club is unique in both its structure and its activities (Lorentzen, et al., 2007). Made up of auto component firms, their main buyer, and academic researchers, the Club studied members' performance, set benchmarks, tackled problems, and encouraged members to upgrade. Success required substantial time, commitment and mutual trust.

⁷ Similar results have been obtained for other regions of the world (see note 6).

However, decades of continued research on clusters, and on their effects and determinants, appear to suggest that nowadays a focus only on their *internal* dynamics is not sufficient anymore, and that external linkages play a central role in firms and in clusters' developments. This is true for the changes in production systems, distribution channels, and financial markets, accelerated by the globalization of product markets and the spread of information technologies that are forcing to pay more attention to external linkages, and to the increasing varieties of inter-firm arrangements. To this end, the global value chain (GVC) approach initially proposed by Gereffi (1999) takes into account activities occurring outside the cluster and, in particular, helps to explain the strategic role of relationships with key external actors.

2. Global value chains (GVCs)

The value chain describes the full range of activities that firms and workers do to bring a product from its conception to its end use and beyond. This includes activities such as design, production, marketing, distribution and support to the final consumer. Rarely do individual companies alone undertake the full range of activities required to bring a product from conception to market. The design, production, and marketing of products involve a chain of activities that are often divided among different enterprises, often located in different places and sometimes even in different countries.⁸

From an analytical perspective, the focus shifts from manufacturing alone to include all the other activities involved in the supply of goods and services, including "intangibles" phases such as distribution and marketing (Kaplinsky, 2000; Wood, 2001). The flows of information, as well as goods, in the chain are captured by this concept, making it clear that linkages between firms are often non-arm's-length. All activities contribute to total value, but it is crucial to identify those activities providing higher returns (i.e. "premia") along the value chain in order to understand the global distribution of value added - and, to our aims, the opportunities for LDCs' firms. It is also important to remark that "rents" also often emerge in GVCs, whenever non-competitive structures emerge and the balance of power is unevenly distributed among actors.

The focus of value chain research is on the ongoing relationships among the various actors involved in the chain and on their implications for development (Humphrey and Schmitz, 2002b). The concept of *governance* is central to the analysis of the relationships among actors in the chain. At any point in the chain, some degree of governance and coordination is required. It is often preferable to write of governance rather than only coordination, as the proactive involvement and participation of all the actors within the value chain is crucial. This governance may occur through arm's-length market relations or through non-market relationships with

⁸ www.globalvaluechains.org presents a synthetic and clear presentation of these concepts.

different hierarchies: network, implying cooperation among firms of more or less equal power that shares their competencies within the chain; quasi hierarchy, and hierarchy (Humphrey and Schmitz, 2000; Pietrobelli and Rabellotti, 2004,2006, 2006a).

Other authors (Gereffi, et al., 2005) identify five different GVC governance patterns: (i) *markets*, (ii) *modular* value chains, when suppliers make products or provide services to a customer's specifications, take full responsibility for process technology and often use generic machinery that keeps switching costs low, (iii) *relational* value chains, with mutual dependence regulated through reputation, social and spatial proximity, family and ethnic ties, where trust plays a central role – such as in industrial districts (Pietrobelli, 1998); relationships tend to be idiosyncratic and thus difficult and time-consuming to re-establish with new value chain partners. (iv) *captive* value chains, when small suppliers tend to be dependent on larger, dominant buyers, that exert a high degree of monitoring and control; and (v) *hierarchy* (vertical integration).

These authors develop a theory of what makes GVCs different, and influences how GVCs grow and develop over time. They acknowledge the substantial industry- and location- specificity of all GVCs, and identify three important variables to look for when studying GVCs: the complexity of transactions, the codifiability of transactions, and the competence of suppliers.⁹

Most importantly, the GVC literature also stresses the role played by the GVC *leaders*, particularly the buyers, in transferring knowledge along the chains. For small firms in less developed countries, participation in value chains is a means of obtaining information on the needs of global markets and of gaining access to those markets. Although this information has high value for local SMEs, it is less clear what role the leaders of the GVCs play in fostering and supporting the SMEs' upgrading process. Empirical evidence suggests that insertion in a quasi-hierarchical chain may offer favourable conditions for process and product upgrading but hinder functional upgrading (Humphrey and Schmitz, 2000, Pietrobelli and Rabellotti, 2006, Giuliani et al., 2005); networks offer ideal conditions for all forms of upgrading, but they are the least likely to occur among producers in developing countries.

3. In sum

⁹ Their theory leads to formulate expectations of how value chain governance patterns tend to change in predictable ways. "For example, if a new technology renders an established codification scheme obsolete, we might expect modular value chains to become more relational, and if competent suppliers cannot be found, then perhaps captive networks and even vertical integration would become more prevalent. Conversely, rising supplier competence might mean that captive networks move toward the relational type and better codification schemes might prepare the ground for modular networks." Gereffi, *et al.*, 2005, as reported in www.globalvaluechains.org)

In principle, both clusters and value chains may offer interesting opportunities for the upgrading and modernization of local firms, and they are not mutually exclusive. However, a deep understanding of the organization of inter-firm linkages and the internal governance structure of value chains is needed to assess their potential contributions to local SMEs' innovation, upgrading, and development of TCs.

These tend to vary by chain, location and sector. Thus, for example, in agriculture it appears that buyer-driven governance is increasingly exercised through hands-off forms of coordination, while institutionalising a category of explicit first-tier suppliers (Gibbon and Ponte, 2005). This is made possible by codifying and standardizing quality and performance requirements, and adopting third-party monitoring and certification. In turn, first-tier suppliers tend to adopt a more hands-on form of coordination with their second- and third-tier suppliers. We shall explore these statements in the next section.

4. The recent transformations of GVCs and the opportunities for LDCs

In describing the evolution of GVCs during the last two decades, Gibbon and Ponte (2005: 122) emphasise the uneven but significant rise of "*buyer drivenness*" in GVCs. The rise of buyer-driven chains has been facilitated by developments in the national and international regulatory frameworks, trade and import liberalization, increasingly stringent food (and sanitary) safety regulation, the increased currency convertibility, transport market liberalization and improvements, and reduced costs in international communications and transport.

The notion of "driving" a GVC was initially conceptualised by Gereffi (1994) in terms of leaders' transfer of the so-called low profit functions to firms in other functional positions along the chain in order to obtain enhanced organizational flexibility. In fact, today the overall process of driving appears to be related to the relations between lead firms and first-tier suppliers, and between first- and second-tier suppliers (Gibbon and Ponte, 2005), and to the allocation of control over the definition of the functions that first-tier suppliers should play. Some of the externalised functions may in fact be more profitable (Sturgeon, 2002), but lead firms may indeed want to get rid of them because of their medium-term cost implications or because of their own assessment of what they consider to be their core competences.

Moreover, the nature of the supply chain has changed considerably, and buyers and retailers increasingly play a role in product development, branding, supplier selection and distribution, and this especially true for agricultural and fresh produce (Dolan and Humphrey, 2000, 2004; Humphrey, 2005). These difficult changes represent opportunities but may also threaten exclusion for those suppliers that are unable to respond to the challenge.

More specifically, Humphrey (2005) suggests that there may be opportunities for:

- Increased processing, much of it close to growing sites.¹⁰ Retailers are often willing to outsource value chain functions to suppliers, providing new opportunities along the chain;
- Increasing product differentiation and investing in innovation;
- Improved systems within supplying countries to respond to the demand for greater emphasis on freshness and agility within the logistics system; and
- Emphasis on parts of the supply relationships such as reliable delivery, trust, flexibility in supply, ability to innovate, that increases the switching costs for the buyers, and may increase the length of contractual relationships for sellers.

However, access to the fastest growing market segments depends upon satisfying the demands of retailers, and competing with other suppliers. Large retailers become gatekeepers to markets, hindering and/or fostering access.

5. Sectoral specificities affecting upgrading: Selected evidence from Latin America

The impact of clustering (*via* collective efficiency) and value chains, and their patterns of governance, on the capacity of SMEs to upgrade and acquire TCs may differ across sectors.¹¹ This claim is based upon the consideration that industrial sectors differ in terms of technological complexity and in the modes and sources of innovation and upgrading.¹² As innovation studies have shown, in some sectors vertical relations with suppliers of inputs may be particularly important sources of product and process upgrading, as in the case of textiles and most traditional manufacturing. However, in other sectors, the major stimuli for technical change may be provided by technology users, organizations such as universities or the firms themselves, as, for example, with software or agro-industrial products (Pavitt, 1984).

¹⁰ For example, transfer of post-harvest processing of fresh vegetables to producer countries has been observed in Kenya, where a substantial number of new jobs have been created as a result (Humphrey, et al., 2004).

¹¹ This claim has been extensively studied and supported in several papers on Latin America. See Pietrobelli and Rabellotti (2004, 2005, 2006) and Giuliani, et. al. (2005).

¹² In order to observe the variety of innovative processes across sectors, Nelson and Winter (1982) introduced the crucial concept of “*technological regime*,” which they broadly define as a technological condition that defines the boundaries and the direction of the innovative and problem-solving activities of technicians. More recently, technological regimes have been differentiated on the basis of concepts such as technological opportunity, appropriability of knowledge, cumulativeness of learning, and nature of the knowledge base (Malerba and Orsenigo, 1993).

For example, in traditional manufacturing sectors, technology has important tacit (Polanyi, 1967) and idiosyncratic elements, and therefore we expect upgrading to depend on the intensity of technological externalities and cooperation among local actors (e.g., firms, research centres, technology and quality diffusion centres). This leads us to expect that global buyers are expected to be more involved and interested in their providers' upgrading if the technology required is mainly tacit and requires intense interaction. Moreover, in traditional manufacturing industries, characterized by a low degree of technological complexity, firms are likely to be included in global value chains even if they have very low TCs. Therefore, tight supervision of and direct support to suppliers becomes a necessary condition for global buyers who face high "switching costs", and want to reduce the risk of suppliers' non-compliance (Humphrey and Schmitz, 2002).

In order to address the issue of sectors' influences on the role of clusters and GVCs for upgrading and competitiveness, in related papers we developed and used a sectoral classification that retains the key notions of Pavitt's seminal work (Pavitt, 1984), and adapts existing taxonomies to Latin America (Pietrobelli and Rabellotti, 2006) (Table 3.1). However, most of these activities hardly exist in LDCs, where simple manufacturing and natural-resource-based sectors are by far the most prevalent sectors. In the rest of this section we therefore focus only on these sectors.

Table 3.1 Patterns of learning and innovation in different sectoral groups in LA

Groups	Industries	Learning Patterns	Description
1. Traditional manufacturing	Textiles and apparel, footwear, furniture, tiles	Mainly supplier driven	Most new techniques originate from machinery and chemical industries; Opportunity for technological accumulation are focused on improvements and modifications in production methods and associated inputs, and on product design; Most technology is transferred internationally, embodied in capital goods; and Low appropriability, low entry barriers.
2. Resource-based	Sugar, tobacco, wine, fruit, milk, mining industry	Supplier driven, science based	Importance of basic and applied research led by public research institutes due to low appropriability of knowledge; Innovation is also spurred by suppliers (machinery, seeds, chemicals etc.); Increasing importance of international sanitary and quality standards, and of patents; and Low appropriability of knowledge, but high for input suppliers.
3. Complex products	Automobile and auto components, aircraft,	Scale intensive firms	Technological accumulation is generated by the design, building and operation of complex production systems or products;

	consumer electronics		In-house R&D is critical for innovation; Process and product technologies develop incrementally; In consumer electronics, technological accumulation emerges mainly from corporate R&D labs and university skills; and Appropriability is medium, high entry barriers.
4. Specialized suppliers	Software	Specialized suppliers	Important user-producer interactions. Learning from advanced users; Low barriers to entry and low appropriability; and High in-house R&D for development of edge technologies.

Source: Giuliani, et al. (2005) and Pietrobelli and Rabellotti (2006).

6. Evidence on natural resource-based clusters and value chains in Latin America

In our classification (Table 3.1), NR-based industries are essentially agro-industrial activities (e.g. fruit, sugar, wine, salmon, and milk) and some mining industries. Although these activities have some characteristics of the "supplier dominated" industries (Pavitt, 1984), they also share some features of the "science-based" industries, as they evolve, change and innovate on the basis of scientific discoveries and their subsequent technological upgrading. The bulk of research is carried out by Universities and Research Labs of biotech, chemical and food firms (e.g. tobacco TNCs). Local farmers, breeders and producers often contribute with incremental improvements in the production process and in product differentiation. Instead, in mining and other extracting industries (e.g. marble and copper), innovation is carried out mainly by suppliers of machinery and inputs.

Table 3.2. List of case studies of natural resource-based clusters in Latin America

Case Study	Country	Source
Tobacco, Rio Pardo	Brazil	Vargas (2001)
Wine, Colchagua	Chile	Giuliani (2005); Giuliani and Bell, (2005)
Wine, Serra Gaucha	Brazil	Vargas (2001a)
Sugar, Valle del Cauca	Colombia	Millan (2002)
Marble, Espirito Santo	Brazil	Villaschi and Sabadini (2000)
Copper, Cuajone-Toquepala	Peru	Torres-Zorrilla (2000, 2001)
Salmon, Austral Region	Chile	Original field study (Maggi, 2006)
Milk, Boaco, Chontales	Nicaragua	Original field study (Artola and Parrilli, 2006)

Mangoes and grapes, Petrobrina-Juazeiro	Brazil	Original field study (Gomes, 2006)
Melons, Rio Grande do Norte	Brazil	Original field study (Gomes ,2006)
Apples, Santa Catarina	Brazil	Original field study (Gomes, 2006)

Note: In bold are new, original case-studies (Pietrobelli and Rabellotti, 2006).

Natural resource-based sectors are increasingly affected by the structural changes in economic relations imposed by globalization. The global market for fresh fruits and other natural and animal products has become increasingly demanding, both in terms of better quality and of socially and environmentally sustainable production processes. In other words, the imperative of continuous scientific and managerial innovations to respect demanding standards is clear and dominating also for small growers (Dolan, et al., 1999; Farina, 2002; Gibbon, 2001; and Reardon, et al., 2002).

The empirical evidence on which this section is constructed derives from detailed and original field studies and from an extensive literature survey. The details are reported in Table 3.2. and in Pietrobelli and Rabellotti (2006).

7. On the origins of clustering

The start of the **Chilean salmon cluster** was due to an enlightened public-private cooperation and a process of collective learning that was catalyzed by the rise of external demand and an active horizontal policy to support exports (Maggi, 2006).

The first experiments to explore the potential of Chile's Southern region (X Region) for fish farming — unknown in this part of the world by then — were attempted in the 1960s, and generated a significant progress in specialized technical knowledge, but did not lead to major success. The "open sea ranching" technique did not prove successful. In 1981, *Fundación Chile* bought the plants of Domsea Farms (a Chilean subsidiary of Union Carbide) and founded *Salmones Antártica*, that turned out to be the first firm to produce more than 1,000 tons in 1988 (Pietrobelli, 1998). Other initiatives were carried out in the Llanquihue Lake, and supported by CORFO, the Japanese company Nishiro and the fishing company *Mytilus* (now *Mares Australes*). An additional indicator of the growing success was the creation of the *Asociación de Productores de Salmón y Trucha de Chile* (APSTC, today *Salmon Chile*), that grouped 17 national producers in 1986. The Association managed to coordinate the process of commercialization urging producers to respect the export quality standards through a voluntary trade mark that helped set a minimum quality level for all producers (members and non-members).

Thus, *the interaction of public and private initiatives in a new and risky business was fundamental to set success models and provide the essential public goods for this sector.*

The transformation of the local economy of **Petrolina Juazeiro (PJ, Brazil)** into a dynamic **mango and grape cluster** is instead *the result of centralized government planning* (Gomes, 2006). In 1948, the Federal government created the San Francisco River Valley Development Agency (CODEVASF), a parastatal targeting the promotion of navigation, irrigation, agricultural and industrial development in the San Francisco River Valley. In the 1960s and 1970s, in PJ CODEVASF expropriated land in order to implement public irrigation projects; enlisted growers and agricultural processing firms of different sizes in each project; provided incentives for agricultural industries to establish in the region; and supported the creation of a growers' association (VALEXPORT) that was key to the formation of export channels.

In providing different sized lots, CODEVASF explicitly established a structure of production consisting of both large and small growers. It provided hundreds of small growers with irrigation-ready lots (with on-farm pumps, canals, and drainage system installed and ready for use), guidance on what to produce, technical assistance, and facilitated access to credit and buyers. Initially growers paid a nominal fee for the lots and received most of the support at no cost. Later, in the late 1980s, CODEVASF began charging water fees and drastically reduced its technical assistance.

Interestingly, such strategy also has a noteworthy technological dimension. Thus, CODEVASF promoted a sequence of crops that facilitated the learning process of small growers, most of whom had never previously worked with irrigated agriculture. Thus, growers first produced a combination of annual crops, including beans, corns, and melons, followed by widespread adoption of industrial tomato, and subsequently higher-value fruit crops, including mangoes and grapes. The transition from phase to phase involved a combination of conventional and more innovative support policies to help growers in each, consecutively more difficult, phase. Examples of such innovative approaches were, for example, related to the adoption of industrial tomatoes, that involved an unusual level of coordination between CODEVASF, the Bank of the Northeast, processing firms, and growers. Likewise, the transition from tomato to perennial fruit crops involved coordination between CODEVASF and the Bank of Northeast, where the Bank "unintentionally" served as a conduit of technology transfer between firms and small growers. It did so through its loan application process which required bank professionals – familiar with irrigated agriculture – to visit each farm to assess the proposed project, including its choice of technology (Gomes, 2006)

The story of the inception of the **apple cluster in Santa Catarina (SC, Brazil)** is somewhat different, as the cluster is the result of *the initiative of pioneer entrepreneurs together with public support and extension policies*. In the SC State apple production is spread across two main growing regions centered around the cities of Fraiburgo and São Joaquim. These cities share the title of "Brazilian apple capital",

and since the 1970s have had in the apple sector their main source of income and employment.

Commercial apple production in SC dates back to the 1960s when private entrepreneurs began experimenting with different varieties. German and French immigrants led the efforts in Fraiburgo, while Japanese immigrants led those in São Joaquim. These pioneers were instrumental in experimenting with different apple varieties and in establishing a market for domestically produced apples at a time when Brazil imported 90 percent of its apples.¹³ Following the example of the pioneers, many other growers came, and today a great variety of firms and growers prevail.

However, also public policies initially, and later institution building efforts, played an important role in generating this cluster. Thus, the early Federal fiscal incentives enabled the pioneer firms in Fraiburgo to expand their production of apples and take risks that they otherwise might not have taken, but contributed little to the advancement of the technical know-how in the sector until the Project for Temperate Fruits (PROFIT) was created. PROFIT aimed at implementing a determined area of apple production in the state and provided all the necessary support, including agricultural credit, extension, training, and research, all through its Agricultural Credit and Extension Agency, ACARESC (subsequently transformed into the SC State Agricultural Research Agency, EPAGRI). This early State support was striking in its aggressive outreach efforts. It established extension offices in each of the regions considered favorable for apple production. Each local EPAGRI office had at least one agronomist specialized in temperate fruit production for every 20 growers. These extension workers constantly interacted with growers, visiting each at least once a week at home and in the field. EPAGRI also offered training courses and seminars for growers held in its training centers throughout the state, paying for growers' travel and participation. As for research, the state invested heavily in training its cadre of researchers and sought technical expertise and financial resources throughout several advanced countries that had extensive experience with apple production. These included collaboration with Israeli, German, and United Kingdom institutions, and with Cornell University in the United States.

In contrast, **melon production in Mossoró, Rio Grande do Norte** (RN, Brazil) did not begin because of public sector support. In fact, the cluster was generated by *the early initiative of two innovative and risk-prone entrepreneurs, that foresaw a window of opportunity*. These pioneering firms were first-movers in every respect (Gomes, 2004).

¹³ In addition, the pioneers in each case established the very different structure of production which still dominates today, with large firms in Fraiburgo and small growers in São Joaquim. This is coherent with the natural environment prevailing, with the rolling hills in Fraiburgo favouring large landholdings, and the rocky, mountainous terrain in São Joaquim favouring smaller holdings (Gomes, 2006).

Where once the production of cotton, corn and beans dominated agricultural production, a large commercial firm ventured into the production of melons in the late 1980s in Mossoró, sensing a potential for this crop in the region. To begin production, this firm hired a grower experienced with melon production in Sao Paulo. By the mid-1990s, this firm was the single largest melon grower in Brazil. Its success inspired another entrepreneur from Sao Paulo to establish what turned out to be the second largest firm in the sector. Together, they accounted for about 70 per cent of the melons produced in the region in this period.

The provision of abundant and highly subsidized venture and investment capital in the mid 1970s enabled these pioneering firms to test new varieties of melons and learn the best production practices for the local conditions, establish domestic and foreign export channels, and build a recognized name for locally produced melons. However, with the tightening of credit and the general changes in the Brazilian economy in the mid-1990s resulting from the Real Plan, these firms entered a period of financial crisis. One of them closed down while the other drastically reduced its production.

However, despite the demise of these firms, their venture into melon production was crucial to boost the emergence and growth of a cluster. They proved that RN had a favourable environment for melon production, identified suitable varieties, established domestic and export marketing channels, and trained hundreds of field workers and agronomists that subsequently spread their know-how throughout the cluster. The participation in production by SMEs increased from 9 per cent in 1990 to 27 per cent in 1997, and it is likely to be as high as 30–40 per cent today.

Summarizing, clusters in this group of sectors may have very different origins, being sometimes the result of centralized planning, and other times of private decentralized initiatives. However, in all the cases analyzed, the presence of an entrepreneurial project has always proved essential, together with State policies, carried out at the Federal or at the local level, in terms of subsidized credit, agricultural extension, or in other forms.

8. Collective efficiency

(i) External economies

There is substantial evidence to suggest that in many cases, in spite of the frequent productive agglomerations in Latin America, the development of external economies and cooperation remains minimal. Overall, we may observe that clusters in our sample appear to have *more sources of external economies than joint actions*.

The major source of external economies is the creation of a pool of specialized skills that benefit both workers and firms. Perhaps in some relatively more backward

areas labour skills are not very advanced, but tend to match well relatively backward technologies, like in the dairy cluster in Nicaragua (Artola and Parrilli, 2006). In a dynamic cluster the endowments of skilled labour tend to rise over time, as a result of individual firms' training activities, or joint actions in training, or the intervention of the public sector: this appears the case of the Chilean salmon cluster (Maggi, 2006). The Chilean wine cluster in Colchagua also benefits from local expertise that usefully complements foreign ("flying") expertise (Giuliani, 2003).

(ii) Joint action

The evidence on the three clusters of fresh fruit production in Brazil is especially instructive for the role that joint actions may play (Gomes, 2006). All three clusters enjoy similar levels of external economies, with a qualified labor pool, easy local access to nearly all inputs, and to information on markets and technology. However, they remarkably differ in terms of joint actions and the institutions that growers and the public sector have created to support the upgrading process.

In terms of joint actions, at one extreme is mango and grape production in PJ, which is the result of concerted planning by a federal parastatal, while at the other extreme is melon production in RN, mostly the result of private entrepreneurship and only minimal public support. Somewhere in between is apple production in SC, where the public sector was very active with research and extension, but did *not* have a broad range of interventions like that in PJ.

What can explain such strikingly different levels of JA in the three experiences? A possible explanation lays in the structure of production: the empirical evidence suggests that less concentrated structures of production are associated with a greater level of joint action among growers (Gomes, 2006).

In SC, firms and small growers also interact through vertical coordination, ranging from the outsourcing of production through long-term contracts to on the spot negotiations at harvest time. In PJ (mangoes and grapes) in some cases, the exporting firm visits suppliers weekly, provides technical assistance, does soil analysis for fertilizer schedule, suggests the harvest calendar, harvests and transports mangoes to the pack house, and advances credit to purchase inputs.

The situation of forward and backward linkages in the melon cluster of RN is radically different. The two lead firms never managed to collaborate in anything beyond the few activities of the melon growers association, PROFRUTAS, which itself was created only in response to demands from the USDA, but remained a weak and disarticulated association, with limited reach and voice. Thus, *the RN cluster stands out for its comparatively low level of joint action.*

This is in stark contrast with the experience of the **salmon cluster in Southern Chile**. In this case, policy requirements have changed and evolved with the development of the local system, and public policies, together with private initiatives have generated several remarkable joint actions. In the evolution of this cluster, three different phases may be singled out:

In a *first phase (1978–85, initial learning)*, the central challenge was to learn to produce a new good in the new conditions, and this required a lot of pre-competitive investments in R&D, pioneer risky initiatives, with both private and public entities investing in the new venture. This would later induce a demonstration effect to convince new investors to engage in the business. In this phase, policies reflect such conditions, and chiefly consist of the actions of public actors such as *Fundación Chile* and Ifop (*Instituto de Fomento Pesquero*), and international development cooperation agencies, directed to the creation of essential public goods such as basic physical and research infrastructure, knowledge and technology to breed salmon in these conditions, success models to imitate.

In a *second phase (1986–1995, maturing)* the imperative to gain competitiveness was to standardize production quality and increase production size. This needed better infrastructure, better local providers of cages, nets, food, with the local agglomeration of providers of such goods and services gaining importance. Moreover, efforts to upgrade functionally emerge, by promoting and marketing Chilean salmon abroad. Policies differ in this period from the previous phase: subsidies are offered by public agencies such as CORFO and ProChile to create technical capacities. For example, INTESAL (*Instituto Tecnológico del Salmon*), was created as a public/private (70/30) initiative to strengthen local technical skills and improve technology transfer; SalmoFood, a public/private (20/80) venture involving 13 local salmon producers was founded to enter the strategic segment of food production, until then dominated by foreign producers; Salmocorp brought together 13 national producers –30 percent of total production – to sell abroad, and ProChile promoted Chilean salmon in the US to develop new markets in collaboration with Canadian producers.

In a *third phase (globalization, since 1996)*, the aim was to raise productivity through technology transfer (foreign missions) and biotechnology (genetic improvements and remedies to fish sicknesses). Moreover, several efforts were made to improve the regulatory aspects of the sector. Thus, for example, public policies introduced environmental controls, and a collective agreement on Clean Production was reached among the cluster firms, the Salmon producers' Association and the state regulatory (Conama) and support (Corfo) agencies. A new environmental Regulation (RAMA) was also introduced. Interestingly, the technical mechanism to allocate resources shifted from that of direct subsidies, utilized in the early stages of the cluster, towards public funding assigned through competitive tenders. This was only possible with the acquired evolution and maturity of the cluster.

In sum, the experience of this cluster has been characterized by remarkable joint actions involving a variety of private and public firms and institutions throughout

all these phases (Maggi, 2006). These cooperative actions were first mainly directed to promote the access to export markets and later, in the globalization phase, to address science and technology, environmental and regulatory issues.

Useful lessons may also be drawn from the cases of *failures in carrying out joint actions*. Thus, for example, **the RN melon cluster** experienced a puzzling *disconnect between growers and public sector research*. However, this caused less damages than could have done because the nature of the market for melons and of its production cycle makes upgrading with melons much "easier", and the traditional dominance of two very large growers in RN, that could do much of the upgrading themselves and never felt the need to pressure the government for public support for the entire cluster. In principle, two public sector institutions could have potentially supported melon growers: the local (Federal) agricultural school (ESAM), and the EMBRAPA centre in the neighbouring state of Ceará. However, they have been very distant from producers since the origin of the cluster, they have had limited capabilities for research on melons, and the two larger growers had no interest in the widespread dissemination of technologies that could facilitate the entrance of other growers into the market.

In the **dairy cluster of Nicaragua** the horizontal bilateral and multilateral relations have improved in the late 1990s, due to the creation of several cooperatives for processing cheese, the Chamber *CANISLAC*, *Alianza Amerrisque* and their important lobbying and service activities. The creation of many cooperatives has been favoured by the international cooperation that had to put much effort to revert the widespread negative attitude towards the concept of cooperative itself, entrenched in the population after the Sandinista period. A successful example appears to be *Cantores*, with 37 cheese manufacturers in Boaco that was planning to set up its own pasteurizing plant with UNIDO and CIDA advice (Artola and Parrilli, 2006). Another interesting example of joint horizontal multilateral action is given by the *Alianza Amerrisque*, involving nine milk producers' cooperatives in Chontales, that together with the *Unión Nacional de Agricultores y Ganadores* (UNAG) was seeking financing to build its own milk processing plant.

As revealed by several field studies, *collective actions are especially important* as far as they are directed to *promote S&T research and development*.

For example, the Brazilian Apple Growers Association in **the SC apple cluster** has a special focus on research and development for the apple sector. The Association adopted its technology program in 1992 with the establishment of a Phytosanitary Alert Station in collaboration with the Ministry of Agriculture and the SC State Secretary of Agriculture, and the implementation of a hail control system to reduce the impact of hailstorms on the region's apple orchards. The relationship between public sector research, represented by EPAGRI, and growers was formally strengthened in 1988 when ABPM developed its own research program funded through members' contributions (about US\$8/ha/year), formed its Technical Council and invited a leading EPAGRI researcher to coordinate its activities. Through this

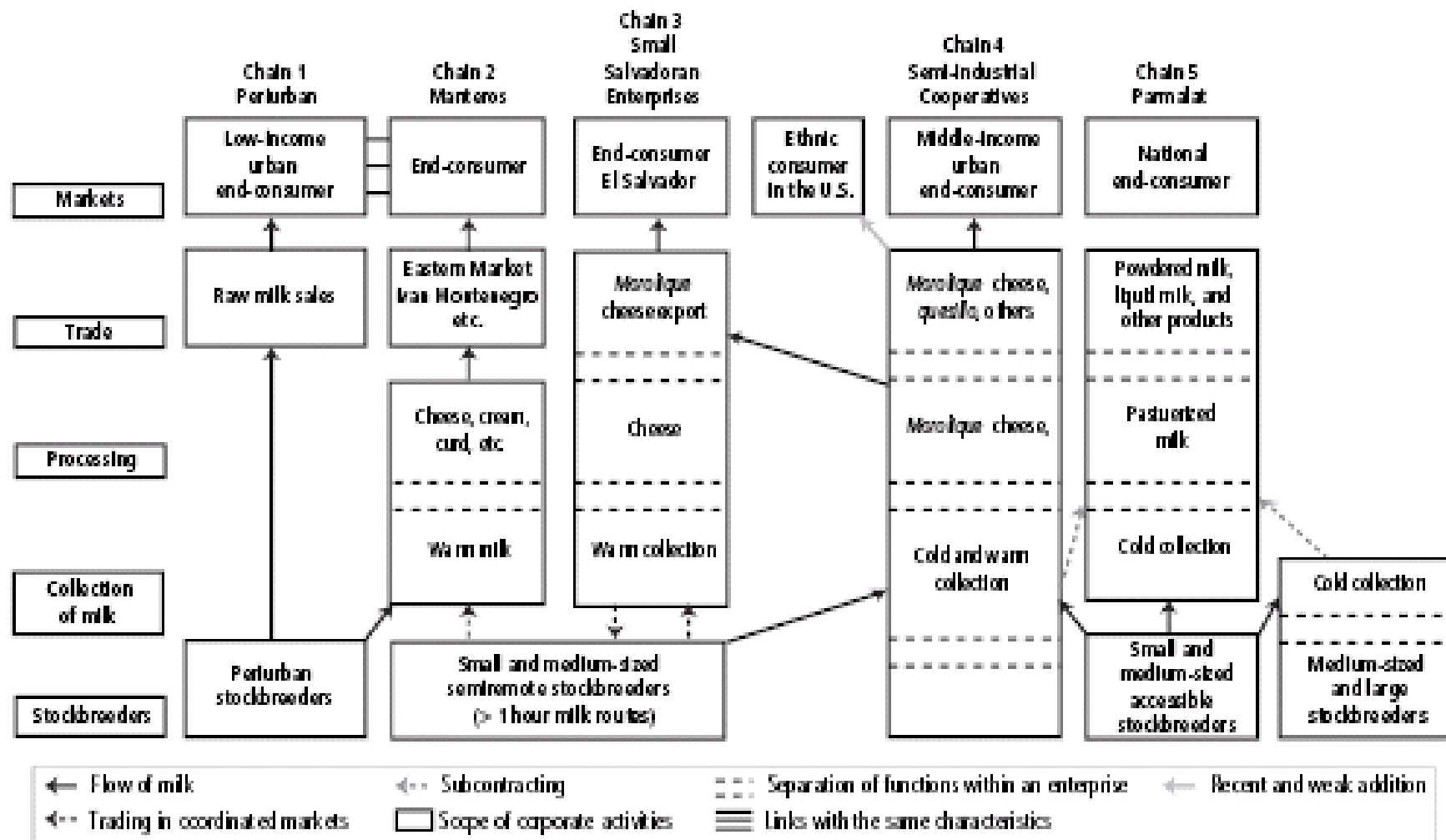
process, ABPM has funded almost 50 percent of EPAGRI's local station's annual research costs.

(iii) Value chains

A great variety of forms of organization and governance of the VC prevail in the cases studied (Pietrobelli and Rabellotti, 2006).

Thus, for example in the **Nicaraguan dairy cluster** multiple value chains have emerged with the development of the sector, each offering varying scope for local firms upgrading. Artola and Parrilli (2006) single out the following main value chains (Figure 3.1):

- *Semi-urban cattle breeders*, essentially producing raw unprocessed milk and selling it to small retail shops and craft food producers near the urban areas in the regions of Boaco and Juigalpa-Chontales;
- *National "manteros"*, who buy milk from the least accessible places, process it in a craft (not industrialized) fashion to produce several dairy goods (i.e. cheese, *cuajada*, creams, butter) to supply the main popular, low income markets in the country;
- *Small investors from El Salvador*, that in the 1990s invested in production plants in the main milk producing areas of the country and produce *morolique* cheese to export to El Salvador and hard cheese to the ethnic markets in the United States. They buy milk from the producers, and cheese from other plants. Their main competitive asset is the knowledge of the export market, its requirements, and the retail networks therein;
- *Semi-industrial cooperatives of small and medium-sized milk producers* that have grouped to share facilities (i.e. milk collecting stations, processing plants and commercial outlets) and other services (credit, technical assistance, machinery). Twelve of them group over 2,000 small breeders. They sell refrigerated milk to processing plants and cheese to traders from El Salvador. They are also approaching the United States' export market themselves, with some increasing success (i.e. functionally upgrading); and
- The large TNC, Parmalat, which entered the national market in 1999, mainly targeting the national and the Central American markets. Parmalat buys milk from a variety of sources: its own milk collecting stations in Boaco and Chontales, and, for the largest part, other milk collecting stations (mainly owned by the cooperatives defined above). Their main markets are higher-income shops and supermarkets in Managua and in the main urban centres.



Source: Design adapted from Boomgard et al. (1992). Data taken from various interviews and secondary sources.

Thus, *upgrading is occurring in different value chains*, i.e. under the quasi-hierarchy of the value-chain led by the main TNC in the sector (Parmalat), as well as within local networks of cooperative producers and VC led by foreign buyers and investors. Since its entry in the market (1999), Parmalat urged local producers to improve higher milk quality standards, and helped develop a new "culture" of milk consumption in Nicaragua. At the same time, local cooperatives have often been pushed to upgrade to improve the quality of the milk they sell to Parmalat, and indirectly to find outlets for their products alternative to Parmalat, accused to overexploit local producers irrespective of their needs. Some cooperatives are attempting to venture into the US ethnic market themselves. Therefore, *the different value chains also interact among them*, mutually providing incentives, and sometimes support, to upgrade (Artola and Parrilli, 2006).

In sum, upgrading is possible within different value chains, but *upgrading tends to be confined to products and processes in quasi-hierarchy chains*, such as the one led by Parmalat. In contrast, *functional upgrading is easier in value chains with a network-based governance*, as in the value chains led by the local semi-industrial cooperatives.

In **fresh-fruit value chains**, there is a clear tendency towards the dominance of quasi-hierarchy forms of governance associated with the restructuring of food retails, where retailers are increasingly shifting towards more direct forms of procurement. In Brazil, the consolidation of food retail has been especially rapid since the surge in investments by multinational supermarket chains, such as Carrefour, Ahold, and Walmart (Farina 2002). Retailers are not usually concerned with backward or forward integration, and prefer to reallocate the risks with other actors in the chain: they relay market information to their suppliers, but seldom engage in their actual upgrading (Humphrey and Schmitz 2000).

In the **tobacco cluster of Rio Pardo Valley in Brazil** a few large conglomerates dominate: British American Tobacco, Philip Morris, Dimon are all present locally. They buy tobacco leaves from local SMEs, and essentially convey to them demands for standards and specifications that the international market requires, without providing business and technical support. The governance of these relationships is eminently hierarchical, where large TNCs set the requirements and signal the standards demanded by the market, and retain the core capabilities that in this sector are related to basic research and marketing. These are especially remarkable in biotechnology R&D for the development of new hybrid or genetically modified varieties of tobacco, as well as to ensure a rigid control of the tobacco leaf production system. Local actors provide a negligible contribution to the process of technological innovation in the cluster, and the potential for local firms' upgrading and development of TCs appears very limited (Vargas, 2001).

(iv) **In sum**

In sum, for natural resource-based sectors process and product upgrading are necessary, and they are notably related to scientific improvements and their diffusion. Constant innovation is crucial to remain competitive in this sector, but often has the characteristics of public goods. All this calls for two possible avenues for SME upgrading: on the one hand, joint actions of an institutional network of business associations, service, training, and research centres, and Universities, oriented to technology development and diffusion. On the other hand, linking up with large global chain leaders, having the financial strength and resources to support such investments in innovation, and engage in cooperative (less hierarchical) relationships whenever possible.

In principle, foreign buyers facilitate the link with the international market by signalling the need and the modes of the necessary upgrading. Buyers become a major conduit for producers to understand the needs of their final customer (Kaplinsky, 2005: 91). Nevertheless, given that the requirements of the international market are often codified by standards (e.g. HACCP), imposing them on to producers bears little transactions costs: buyers relay information on the standards that need to be met, but do not normally support the SMEs' upgrading process, and select SMEs complying with these standards.

The Chilean salmon cluster almost represents an isolated example, where upgrading has taken different forms over time: in the early years upgrading of products and processes has been achieved through joint actions that implied private-public partnerships. Functional and intersectoral upgrading occurred only later, due to individual initiatives, often of the private sector or with its constant involvement, that were made possible by the complex system of institutions and policies that had been put in place.¹⁴

In particular three crucial elements of policy may be singled out in natural resource-based sectors:

- Creation of the conditions for early entry of SMEs in the activity: e.g. allocation of lots to smallholders, technical extension services, elementary learning via the interaction with other firms, state and research and extension agencies;
- Dissemination of research to SMEs; and
- Promotion of public-private collaboration in research, and in activities related to standards setting and complying, with strong SME involvement.

¹⁴ An example of functional upgrading is offered by the integration of different stages in the value chain following the initiative of the largest companies (in some cases TNCs) to achieve economies of scale in logistics, as well as in production. An example of inter-sectoral upgrading are the biotechnology and genetics improvements, and the development of vaccines, often carried out by private firms, but in collaboration with Universities, *Intesal*, large foreign companies, and projects subsidized by public funding (Maggi 2006).

In a recent paper, Pietrobelli and Saliola (2006) explore the patterns of governance arising in value chains led by global buyers and their impact on suppliers' performance with specific reference to Thailand's manufacturing industry. The innovative features of this study are that the authors define a quantitative measure of Value Chains' governance, that is constructed on the basis of variables that signal buyers' involvement (e.g. percentage of sales made exclusively to suit buyer's unique specification, whether the buyer provided information on design/quality (product characteristics) and imposed quality standards, whether he is engaged with the firm in process or product R&D type of activities (RD), and if he sent employees to diffuse new technologies into firms' production facility).

Moreover, the authors compare domestic value chains, global value chains led by TNCs, and GVC led by other global actors, in terms of governance patterns and suppliers' performance. An important finding is that the relationships TNCs have with their suppliers is multi-fold, and as they get engaged in their suppliers' process or product R&D and send their experts to work to disseminate and diffuse new technologies more often than other buyers. In contrast, firms which are part of domestic value chains and those that sell to other global buyers prove to follow modes of governance that imply only involvement in defining design and products' characteristics. Their results suggest that more intense buyers' involvement with local suppliers is associated with higher productivity. This is an important result, as it highlights the potential that FDI may have on local upgrading, insofar as investors' involvement with local firms is ensured.

D. How does this matter for LDCs? Some selected evidence

The key agents for knowledge transfer and organization vary from chain to chain. The "lead" firm may not be responsible for ensuring technical competence along the supply chain. In fact, much of the work of value chain organisation and management is being outsourced by lead firms that create a first-tier of suppliers and push responsibility towards them to an increasing extent. First-tier suppliers in turn increasingly rely on a **series of second- and third-tier suppliers**. Firms from LDCs rarely qualify — have the capacity, skills and volumes — to become first tier suppliers, and in the best case may become second or third tier suppliers.

According to most recent empirical evidence, by far the most demanding entry barrier increases have been for first-tier suppliers (Gibbon and Ponte, 2005, among others). This is perhaps less worrying for LDCs, as no firm from these countries play the role of a leader, and very few that of first-tier (or often even second-tier) supplier.¹⁵

¹⁵ In the six GVCs discussed by Gibbon and Ponte, that is itself one of the very few sources of literature of GVCs in Africa and generally in less developed countries, there are no African lead firms and only a handful of first-tier suppliers. Even worse,

Since the mid-1980s lead firms require more functional *capacities* (i.e. the range of activities, and the related conditions and skills, that suppliers are required to carry out) from first-tier suppliers in all cases, and sometimes also from second- and third-tier suppliers. At the same time, lead firms require higher *performance* levels from second-tier suppliers (i.e. complying with standards to carry out these activities).

These rising demands from buyers differ by sector and by specific value chain. Examples from the clothing chain include larger minimum capacity, fabric sourcing, client-dedicated merchandising, own labs for chemical tests, design services and product development capacity — with performance indicators related to these capacities, such as meeting price points, lead times, various forms of QC systems, codes of conduct, etc.

In the specific case of coffee, the major buyer-driven shift has occurred from sale on description to sale against approved samples (Ponte, 2002). This partly reflects the consequences of deregulation (Ponte, 2002a), and partly those of increased product differentiation and heightened demand for specialty coffees in final markets. For second-tier suppliers, this often implies the ability to produce coffees that match certain social/environmental criteria (e.g. fair trade, organic, shade-grown, "sustainable" coffee).

What are the consequences of these rising demands from buyers for second tier suppliers in LDCs? The risks involved have been described as the risks of marginalization and exclusion (Gibbon and Ponte, 2005:138). The former refers to the possibility of downgrading within the same GVC and being relegated to less-remunerative and more vulnerable segments of activity, while the latter refers to the eventual inability to enter, and being utterly excluded from global chains.

This risk dimension is also present for the successful local firms. For example, in the clothing value chain originating in Mauritius, local industry responded successfully to the new quality demands, but this move by some has excluded several others. In fact, the need to meet consistently higher quality requirements has implied integration into larger plants: an average 15 per cent per year of enterprises closed down during 1992–95. The larger firms delocalised to Madagascar (50,000 new jobs were created there during 1996–2001), and often replaced local manpower with foreign cheaper workers (Gibbon, 2004). Smaller enterprises were in fact excluded by the clothing value chains.

The stories of exclusion and marginalization differ in different value chains and countries, but the risks have become a standard typical characteristic. However,

only in the case of the clothing chain from Mauritius, and perhaps the cotton chain, are there very few African-owned second-tier suppliers (Gibbon and Ponte, 2005: 159).

these risks do not necessarily imply marginalization and exclusion: the evidence reveals that it is not easy to escape from marginalization, but it is indeed possible, and home efforts to build TCs are essential (see the examples of upgrading below, and Gomes, 2006; Artola and Parrilli, 2006).

In some cases, clever strategic alliances with the lead firms may help, as there are specific circumstances where the private sector has direct business motives for investing resources in transferring knowledge and upgrading suppliers. These tend to be time-limited, and they are usually directed towards strengthening the capability of suppliers to meet the existing requirements of the buyers. However, in some instances public policies expressed directed to favour SMEs' inclusion may help (Gomes, 2006).

Detailed empirical analyses on a chain-by-chain basis are necessary to identify the consequences of these rising demands from buyers for LDCs enterprises. To this aim, instead of broadly writing of upgrading, it may be useful to examine the specific opportunities to get a "reward" (i.e. an advantage or a return, and the concrete roles that suppliers may play to get such rewards (Gibbon and Ponte, 2005).

The recent case study on the restructuring of Mauritian clothing sector during the late 1990s is revealing in this sense. The study identified two distinct strategies followed by Mauritian-owned firms to remain competitive in spite of rising local labour costs and falling margins. The first strategy was essentially a story of functional upgrading into own-design and in some case own-brand manufacturing (similar to Gereffi's account of Hong Kong producers). The second strategy was characterised by a clear focus and specialization in manufacturing of a more basic range of products in very high volumes, through opening satellite plants in near and cheaper Madagascar. The capacity for shorter lead time and higher-value work was retained in Mauritius. Following Gibbon, the first strategy proved unsuccessful due to distance from main end markets and narrow managerial skills, while the second one was more successful. In the GVC vocabulary, this represented a case of "downgrading" the product range (part of it) and the production process. Yet, this process enabled the enterprises to offer a broader mix of products with a wider range of prices and lead times to a wider range of customers – in some cases at better contractual conditions.¹⁶

¹⁶ An interesting case of functional upgrading has been detected by Roberta Rabellotti in the Brenta shoe district in Northern Italy (Rabellotti, 2004). She reported that during the second half of the 1990s, many shoe firms in Brenta became subcontractors of high fashion companies and abandoned their design and marketing capabilities to focus on production. Nonetheless, these firms performed better than the rest of the district's enterprises because profits in the luxury fashion industry are very high. The issue is made more complex, as the internal dynamism of the cluster was at least twofold, with some of the firms in the cluster upgrading, whilst most others downgrading.

By studying the current reward structures of specific value chains one may better understand how second-tier suppliers may occupy roles that trigger special rewards. This also helps exploring the extent to which LDCs producers have attempted to occupy these roles, and the opportunities they may have had in this respect. Table 4.1 presents the structures of rewards in selected GVCs in sub-Saharan Africa, and the roles that local suppliers may occupy to get them.

Table 4.1 Structures of rewards in selected GVCs in sub-Saharan Africa

Sector	Reward	Roles to get these rewards
Clothing	Security of contracts, ability to compensate for secularly falling prices through larger volumes;	<ul style="list-style-type: none"> ▪ Sales ordered in advance by trading houses and direct sales to retailers ▪ Become a recognized producer of a product type ▪ Meet special delivery conditions (delivery on call-off)
Coffee	Achieve reference prices; Medium and long-term purchasing commitments; Considerable premia (direct sales, long-term purchase commitments, multi-season prices...)	<p>Become a non-anonymous seller (typically from large exporter – in Latin America)</p> <p>Specialize in specialty coffees within the Arabica market</p> <p>In general, limited opportunities to upgrade in tropical countries (it depends on coffee’s physical properties, and most coffee roasters use blends of various origins)</p>
Fresh vegetable citrus	<p>No premium for quality but for producing specific varieties (changing over time)</p> <p>Security of contracts, stability of prices (3-9 months). This in turn allows longer-term planning, planning of larger volumes, economies of scale, cross-subsidization of new product development</p>	Essentially available to suppliers serving large supermarket chains (mostly in the UK)
Cocoa	Traditional reward structures for primary producers have disappeared	Second-tier suppliers (small-holders and cooperatives) can only upgrade by taking on first-tier supplier roles, i.e. engaging in international trading and/or grinding, but this is difficult
Cotton	<p>GVC has less buyer-driven character, and rewards reflect global supply/demand balance – including subsidies</p> <p>Premia attached to form of sale (forward, tender) and timing of sale (early market window)</p>	<p>International cotton trade as a single non-anonymous market bifurcated between coarser and finer cottons – defined in terms of quality and national origins.</p> <p>Reputational dimensions of national origins matter (difficult to measure and prove quality otherwise)</p>

Source: Gibbon and Ponte (2005) and the cases therein.

1. Examples of upgrading

One of the few cases of detailed studies of specific GVCs in SSA analysed cotton, clothing, citrus, coffee, cocoa, and fresh vegetables GVCs, to conclude that there have been relatively few examples of clearly successful upgrading (Gibbon and Ponte, 2005). Acquiring larger volumes – and economies of scale – appear central in most cases, sometimes suggesting an interesting scope for regionalization (large regionally integrated markets), and for SMEs growing to a medium-sized status.

In the clothing sector in Mauritius many producers upgraded in processes and products (diversification) by increasing their operational scale through investments in Madagascar (see above). In South Africa the only notable experiences of upgrading have been recorded in Chinese-owned companies (backward integrating into textiles).

In fresh vegetables several Kenyan exporters have consolidated their supply to United Kingdom supermarkets in the late 1990s by expanding their scale (with investments in Tanzania), improving quality assurance, and diversifying into snow/snap peas and cut flowers. The only remarkable example of upgrading to become a first-tier is that of Kenya's largest fresh vegetable and cut flower producer and exporter, Homegrown (Gibbon and Ponte, 2005: 156).

In the citrus sector, several large growers from South Africa have successfully upgraded to become secure second-tier suppliers. Upgrading has taken the forms of better product quality (e.g. grapefruit exports to Japan), better social practices and reputation. This has produced longer-term contractual relations and, in rare instances, price premia for some becoming exporters.

In the cocoa value chains the only opportunity to upgrade is to acquire first tier status by engaging in grinding. Parastatals and public/private joint ventures in Ghana and Côte d'Ivoire had established grinding operation in 1985–1995,¹⁷ but by 2003, all these ventures were in foreign hands. Although these firms have upgraded in some sense, the countries clearly have not.

¹⁷ The Ivorian company SIFCA even built a new plant in France to produce customized products for the European chocolate industry, and took over another plant in Spain.

In cotton, the experiences from Tanzania and Zimbabwe appear as opposite. While the former experienced downgrading in the 1990s, the Zimbabwean company Cottco consolidated its minor first-tier supplier status by vertically integrating into spinning of cotton knitting yarn, acquired a cotton concession in Mozambique and gained economies of scale in the regional market.

In the coffee value chains the general trend has been one of downgrading of local export companies, now working for foreign-owned exporters. However, the few examples of upgrading among second- and third-tier suppliers regard the following specific instances:

- Participation by mainly private and foreign-owned estates in specialty coffee sales;
- Small-holder cooperatives selling new quality content through fair trade and organic channels;
- In Tanzania, small-holder farm groups selling directly at the auction; and
- Few local traders establishing wet processing plants, and improving their coffee's quality profile.

In some instances however, foreign buyers have offered interesting potential for upgrading through product differentiation (Lewin, et al., 2004; Linton, 2005)¹⁸, and some lessons may be drawn:

- Finding the right buyer can be an important part of promoting agricultural exports, due to the marketing outlet and support for farmers that buyers may provide;
- Value can be added to products in a variety of ways (e.g. for coffee through organic production, environmental sustainability, produce's origin and characteristics);
- The buyer may often provide technical assistance (directly, or through third parties) to ensure that the quality and consistency of the coffee meet the premium market targeted; and
- The link to a specific buyer remained important to achieve certification (e.g. organic and bird-friendly) and identify the product as a premium product.

2. Possible but uncertain benefits from foreign buyers

However, the benefits to the producers of a relationship with the buyer are not granted, and depend on a host of conditions. Clearly, one of the major risks is indeed

¹⁸ Evidence reported by Humphrey (2005) on The Food Brands Group in the United Kingdom, that markets a variety of coffees under the "Percol" brand name (www.percol.co.uk), and claims it to be a "Bird friendly, single estate, organic Arabica coffee" grown in the Altamaya region in the northern Peruvian highland

suppliers' dependence on a single buyer, which often ends up increasing suppliers' fragility and vulnerability to the latter's decision – IFAD (2003) discusses many examples in this sense.

However, although the lead firm may be the driver for change, it is not necessarily the agent that implements change or provides support to deal with change. It may set the target and the roles of the game to win an order (e.g. by setting a standard or a performance that needs to be achieved) and, insofar as the cost of switching to source from another supplier (i.e. switching cost) is not excessive, it may well source elsewhere. Of course, this depends on several elements, including the extent to which information and knowledge required to carry out transactions and production may be "codified" and transferred, on the capabilities of local suppliers, and on the complexity of transactions (www.globalvaluechains.org; Gereffi, et al., 2005; Pietrobelli and Rabellotti, 2006).

The uncertain support provided by global buyers, and their variable engagement with local suppliers leads some authors to argue that LDCs-based firms should aim at "trading down", that is consolidate their suppliers' role focusing on economies of scale, high specialization, and simple and labour-intensive technologies, and aiming at mass markets via large-scale retailers. Specific practical policies should support these processes.¹⁹

However, we do not agree on this conclusion that there would be no alternatives, and thereby rule out all possible strategies leading to the acquisition of new functions within a GVC. If trading down implies withdrawing from the attempts to develop, strengthen and deepen TCs, it should clearly not represent the strategy for LDCs suppliers. The search for specific market niches to exploit advanced capabilities always offers potential benefits. Several examples above illustrate this point. However, if TCs development may come together with "trading down", meaning a focus on high specialization, scale economies and firm-size expansion, this may be an option to choose on the basis of a very pragmatic and ongoing assessment.

E. What role for policies?

Global value chains are increasingly present in developing countries, also as a result of changes in national and international regulatory frameworks, and often represent one of the very few, or perhaps the only option for local firms and suppliers to get access to larger (international) markets and to innovative technologies.

¹⁹ Their use of the metaphor of "trading down" lead Gibbon and Ponte (2005: 201–203) to suggest very meagre perspectives for LDCs' suppliers, describing the experience of exclusion and marginalization as a result of the failure of African farms and firms to meet new expectations concerning quality, lead times, volumes and prices.

However, the prospects of LDCs' firms and farms to benefit from the relationships with foreign buyers do indeed depend on a number of circumstances that may or may not occur.

Is there a role for public policies to improve these prospects and raise the probability of a positive effect on local firms? In this section we try to answer this question and present some criteria that policies should follow and some concrete examples.

Buyers and chain leaders are becoming more and more demanding, but they do not necessarily provide support or transfer knowledge and capabilities. However, the transmission of technology and knowledge, and its effectiveness to improve competitiveness, is not only determined by the leader strategy (i.e. GVC governance) or the strength of local clusters. On the other hand, local firms need to invest in learning and building TCs to effectively innovate and upgrade. Sometimes the role played by local firms in this process tends to be overshadowed. Indeed, the actual pace and direction of learning and upgrading remains crucially affected by firms TC-building strategies.

This does not amount to saying that we do underplay the importance of 'conflicts', power asymmetries and GVC governance in knowledge transfers. On the contrary, they are an essential piece of the explanation of upgrading and competitiveness. However, the level of the firm (farm) remains critical, and policies should reflect this focus.

One of the major and innovative elements of the value chain approach is that it combines a systemic perspective with an emphasis on governance structures (Humphrey, 2005). This implies that any policy implication should at least follow the following principles:

- Key stakeholders, even if located far away from the production systems being targeted for support need to be involved in the policy support. A proper understanding of a value chain analysis may help identify points of leverage that can be targeted effectively by government and donor interventions, as well as the powerful interests within the value chains that may contrast the pursuance of development objectives;
- Acknowledge that markets (and market segments therein) are differentiated according to the differing requirements of different types of buyers; and
- Acknowledge that knowledge flows within value chains play a central role, and that they are themselves the object of a severe competition where power is often vigorously exercised. This stems from the central role that knowledge plays today in all economic/productive activities: competitiveness and upgrading are indeed affected by knowledge flows and the capabilities to exploit them fruitfully.

- a. LDCs' capabilities to design and implement policies to support local

suppliers and producers are usually very weak and should be supported by international cooperation. A clear policy priority is therefore to improve capabilities for strategic policy design, formulation, and implementation in LDCs — and explore and develop avenues for the necessary private-public collaboration. Public-private dialogue and active collaboration is a necessary requisite for effective policies, whose content cannot be defined *ex-ante*, and needs to be defined as an ongoing process through continuous and pragmatic assessments and experiments (Pietrobelli, 2006). Chile Foundation and INIA in Uruguay, are especially insightful examples of private-public collaboration in innovation policies (Boxes 5.1. and 5.2).

BOX 5.1 Public-private collaboration in innovation: *Fundación Chile*

Fundación Chile is the largest private non-profit organisation fostering innovation in Chile. It was created in 1976 as the result of a joint venture between the Chilean government and the US ITT, each contributing with \$25 million to the initial endowment. Its institutional mandate is to transfer state-of-the-art technology, management techniques and human skills to natural resource-intensive sectors. To achieve its goals, *Fundación Chile* creates new companies and joint ventures, carries out R&D, adapts foreign technology for product and process innovation for client companies in the public and private sectors, and fosters the creation of technological consortia and the diffusion of technology to small and medium enterprises, often following a value-chain approach. In the past, it often played a ‘catalytic’ role, pointing out new activities to the market and reducing firms’ transaction costs in acquiring technology and setting up new businesses. In recent years, *Fundación Chile* has focused on biotechnology (forestry genetics and DNA vaccines for aquaculture, among others), financial engineering and information (venture capital), and management. It has also supported the development of clusters in particular in sectors in which Chile is believed to have comparative advantages, such as agribusiness, eco-tourism, forestry and wood processing. Its activities in the areas of skill upgrading focus on life-long learning, long-distance education, the use of ICT in education and management in education. It has been successful with starting new ventures. By 1999, it had set-up 36 ventures, of which 17 had been sold. The six leading companies earned revenues surpassing the total cost of the *Fundación Chile* during its entire existence.

Source: Benavente, et al. (2005), Pietrobelli (1998) and www.fundacionchile.cl.

Box 5.2 Public-private sector collaboration in innovation. *Instituto Nacional de Investigación Agropecuaria* and the rice sector in Uruguay

A good example of a successful policy of collaboration between the public and private sectors is offered by the experience of innovation in the rice sector in Uruguay. A key player here has been INIA (*Instituto Nacional de Investigación Agropecuaria*), an institute for agricultural research created by law in 1990. During the 1990s, INIA developed new rice seeds that are better adapted to Uruguay’s soil and climatic conditions, allowing productivity and exports to grow at a dramatic pace: in the year 2000, productivity reached 6,400 kilograms per hectare, one of the highest in the world, with 96 per cent of the seed used being of national origin. Today, INIA’s rice program, which takes place in experimental stations in several parts of the country, includes studies to identify and treat plagues (biotechnology), improving

irrigation systems and planting methods, and the continuous evaluation of pesticides and fertilizers. Many of these projects take place with close interaction and collaboration with Uruguayan and regional universities, and always with strong coordination with private sector associations.

Source: Adapted from Hausman, et al. (2005).

b. Quality, sanitary and environmental standards, together with industrial standards are playing a growing role in international trade and inter-firm operations within GVCs.²⁰ To this aim, technical assistance may do a lot, especially if administered at the cluster level and through collective institutions and joint actions, involving small growers and producers together with buyers and chain leaders. Policy support actions may include:

- Awareness raising campaigns directed to small producers of the relevance of environmental and hygienic standards;
- Technical assistance to help local SMEs fulfil international standards requirements;
- Technical assistance to strengthen local regulatory institutions, and institutions setting environmental and sanitary standards for local producers; and
- Conditioning of the access to loans and grants on the effective implementation and maintenance of quality and sanitary standards.

In this regard, a relevant and insightful example comes from a program sponsored by the Swedish International Development Agency (SIDA) and the Norwegian Development Cooperation Agency (NORAD) targeting the promotion of African exports through quality and product safety. Since many African countries do not have the means to comply with the international quality and health standards, they are affected by technical barriers to trade (TBT) and sanitary and phytosanitary measures (SPS) more than advanced countries (Box 5.3). The programme was launched in January 2002, and it has been aiming at building awareness with all relevant stakeholders, that include the private sector (farmers, entrepreneurs, traders, exporters), policy-makers in their role of setting the necessary rules and regulations, and specialised institutions that deal with TBT/SPS issues such as testing laboratories, standardization bodies and metrology institutes.

BOX 5.3 Sanitary and phytosanitary requirements for exports: Prawns from Mozambique

²⁰ It has been estimated that Argentina loses on average up to \$1 billion every year due to sanitary problems that force exporters to accept lower prices for their products. This handicap could be overcome by investing \$10–25 million a year over five years into building the necessary state-of-the-art capabilities in its food safety agency to respond to the emerging sanitary and phytosanitary requirements (UNIDO, 2005).

Mozambique is one of the poorest countries in the world with more than 90 per cent of the country exports in the primary sector. Among the most important export products is arguably prawns; in 1994 their export value exceeded that of all agricultural goods. The target market for prawns is mainly Europe. In 1998 the European Union ban on fishery, due to the outbreak of cholera in some fish exporting countries - including Mozambique – remarkably damaged the economy. The main product exported then became deep frozen prawns, not affected by the ban as frozen directly onboard, right after the prawns were captured. However, the European Union requested a laboratory test and the facilities to perform these tests were lacking.

A number of activities were launched to cope with this situation: the government introduced new bills in line with SPS requirements, HACCP was introduced in all the fishing industry and firms had to prove that they were working in accordance to the new requirements. Compulsory training courses for workers and inspectors were organized. The Danish and the Icelandic development agencies supported the creation of laboratories in the two main harbours in Mozambique. These two laboratories are now preparing for accreditation, but Mozambique already regained full access to the EU market for fish products including prawns.

Source: UNDP (2005), NORAD-SIDA (2004), SIDA (2004), *Trade and Poverty*, www.norad.no

Supporting the development of **national standards infrastructures**, especially for certification and testing is a clear priority also to the aim of facilitating local suppliers' integration into GVCs (World Bank, 2002, 2003). An example of a successful policy support to a local certification body in Kenya is described in Box 5.4. This may be appropriate also for rural producers, insofar as developing grades and standards in domestic markets introduces rewards for higher quality.

Box 5.4. Promotion of local certification capability in Africa: GTZ program for AfriCert

Certificates have long since become indispensable marketing instruments, whether they are visible to the consumer, such as the Flower Label, or required on principle by western retail chains for imported fruit and vegetables. Nairobi-based AfriCert, the first certification company in Eastern Africa, has now gained accreditation according to the international ISO 65 standard. AfriCert's seal of approval confirms that producers subscribe to good agricultural practices, namely resource conservation, safe use of pesticides, good post-harvest protection, hygiene, and occupational health and safety. Previously, exclusively European companies offered certification—a costly process that only major growers could afford.

Without the EurepGAP certificate, which powerful retailers in Europe began to demand from their suppliers three years ago, growers are unable to export their goods to European supermarkets, and the growers are now able to receive the same service at much lower cost from a local company. GTZ was responsible for training

AfriCert agents, and enforcing effective monitoring—audits, inspections and systematic quality documentation. AfriCert now offers growers in Kenya and the region affordable certification in line with internationally recognized standards.

Source: <http://www.gtz.de/en/> (quoted by Humphrey and Memedovic, 2006).

In addition to the rising requirements that international standards create, other forms of non-tariff barriers to international trade are widespread in these sectors. While larger firms usually have the competences and means to overcome these barriers, SMEs are especially threatened by them. Several examples may be quoted. A cooperative of small enterprises in Pará, in the Brazilian Amazon, tried to export to Europe traditional sweets made with *cupuaçú* (a very tasty Amazon fruit) and learned that a Japanese trading company had already registered the Indian name *cupuaçú* in the European Patent Office, together with the traditional process of extracting the pulp and making the sweet. Now with the support of the Brazilian government these firms are suing the Japanese firm, but the process will take some time and harm has been made. There are several similar cases, including the attempt to increase exports of *cachaça*, the Brazilian sugar cane spirit to the United States, by a cluster of SMEs in Minas Gerais.²¹

These cases show that access to foreign markets and buyers when tried independently is very difficult, revealing the need of programs to support SMEs access to international markets. Foreign aid programs may help improve commercial linkages between small local farmers and fruit and food importers (Box.5.5)

Box 5.5 Mango exports from Mali through better commercial linkages with European importers

Malian mangoes are of high quality and are well regarded in France, a traditional destination for West African produce. But recently, competitors from Côte d'Ivoire have cut into the Malian share of the French market. This has jeopardized the income of hundreds of fruit farmers and intermediaries who depend on this high-value export. A private sector development project has recently helped a group of Malian exporters — who previously worked in isolation and in competition with one another — to pool their resources to compete with their Ivorian neighbours. The exporters developed a commercial relationship with fruit importers in Britain. These new ties, coupled with declining sea freight rates to Northern Europe, have created an opportunity for the exporters to target new markets and develop expertise outside France.

In addition, the project's Agro-Entreprise Centre helps the exporters launch a marketing campaign in Britain and Germany and assists them with quality control, packaging, and determining the best financial mix for processing Malian mangoes. The exporters already have a modern, computerized packhouse complete with cold

²¹ José Cassiolato, personal communication 7 March 2003.

storage and refrigerated trucks. Skilled teams of buyers select the best fruit at the orchards, and an established mango exporting firm in Sikasso utilizes its excess capacity to process the fruit. The project is helping agribusiness operators recognize new opportunities, develop bankable business plans, manage profitable enterprises, and compete in the international market.

Source: http://www.chemonics.com/projects/default.asp?content_id={82D2AE83-82DE-4ABC-80D9-5D35172D6E5E}

c. Research on clusters in natural resources suggests a number of policy recommendations (Pietrobelli and Rabellotti, 2006b). In NR-based clusters, an essential field of intervention is the access to scientific knowledge, clearly a necessary condition for participating in global value chains. If research is concentrated in the leader of the chain, SMEs do not easily get access to these findings, and the role-played by public, local research institutions aimed at carrying out research, disseminating findings, and assisting SMEs to adapt and internalize the research advancements in their production process becomes therefore very important.

On the other hand, the development of efficient and effective local public research institutions is often difficult for various reasons:

- There is no collaboration between local institutions and large enterprises, that also carry out substantial research;
- Large firms also control the connections with the market from which the stimulus to innovation usually derives; and
- Finally, large firms may also extend their power of control on local institutions, participating in the definition of their research strategy (e.g. the RN melon cluster described by Gomes, 2006).

Therefore, policy programs should help disseminate research to SMEs, and Brazil offers useful experiences in this regard (Gomes, 2003). Efforts to engage SMEs in collaborations with research institutions should be pursued, in order to help guide the research priorities in directions that are useful to SMEs as well as (and not only to) large firms and traders.

In these sectors, SMEs often face higher entry costs in several productive activities and in value chains. Their entry into such businesses should be facilitated through actions such as:

- Allocation of lots in public projects for SMEs and larger growers;
- Increase availability of working and investment capital by development banks;
- Improve access to appropriate storage facilities at ports;
- Support to participate in national and international fairs where SMEs could display their products and make contacts with potential buyers; and

- Support is also necessary to strengthen skills and abilities in the backward production stages along the chain, and foster local suppliers' capabilities to interact with global buyers.

d. Horizontal cooperation may be supported at different stages of the value chain due to the economies of scale that exist in service delivery and in the development of local systems to address standards. This reflects the often insufficient size of many local suppliers. The pressures due to increasing buyer-drivenness and the compelling demands on local suppliers all point to the need to grow in size and capabilities. In this sense, the cluster-level is often the appropriate one to design and implement many policies. These may include, for example, the promotion of cooperatives, to enable coordination and pooling of production, and efficient delivery of technical assistance, and the support of out-grower schemes linking small farmers and large buyers, that may offer technical assistance and also take on some of the tasks critical for compliance with standards, such as pesticide spraying in export horticulture (Humphrey, 2005: 33). Box 5.6 presents an example of a program to promote cluster development in Tanzania. Similar conclusions are also supported by case-studies in Oyelaran-Oyeyinka and McCormick (2007).

BOX 5.6 Rice farmers' associations and clusters in Tanzania

The lesson the rice farmers of Tanzania's south-western Mbarali district have learned is that the potential of inter-firm collaboration and clustering is remarkable. Operated in six regions that account for a third of Tanzania's population, the Private Enterprise Support Activities program (PESA) — supported by USAID (the United States Agency for International Development) — focuses primarily on association development, encouraging farmers to form producer associations or to strengthen existing groups that pool resources and improve their sales position. The associations also serve as vehicles for training in marketing, bargaining, and financial management skills.

In Mbarali, the Program has reached 17 producer associations and farmer networks representing 7,500 households. To reduce their reliance on moneylenders, association members formed 11 savings and credit cooperative societies. Members contribute small amounts — usually \$3 to \$5 a month — and after six months are allowed to take out loans up to three times their deposits (with guarantees from two other coop members). They use the money to buy seeds and invest in their farms. The groups are also uniting to improve their bargaining power. Eight associations representing 129 producers have agreed to combine their crop yields and seek a long-term, reliable contract. These farmers have also applied new production techniques that have boosted yields and incomes. The rice farmers of Mbarali, by working together and collectively building their knowledge, have the opportunity to use higher incomes to improve their productivity through capital investment, technical training, and innovation.

Source: http://www.dai.com/work/success_stories_detail.php?stid=25

e. Open dialogue, transparency, accountability and constant evaluation in the design and implementation of policies are always necessary. These principles should contribute to minimize corruption and private individuals' (and firms) capturing the whole benefits of policies – thereby preventing deadweight losses, and hindering spillovers and overall welfare improvements.

f. Policies need to adopt a dynamic approach and evolve over time. This is especially necessary for private sector development, as the final beneficiaries of these policies are firms facing a continuously changing economic, technological and regulatory context. The experience of the Chilean salmon cluster described above is an example in point, where policy requirements and realizations have evolved over time with the development of the local system (Maggi, 2006). Initially, pre-competitive investments in R&D and pioneer risky initiatives, both private and public, were favoured, and this produced a remarkable demonstration effect. Later, the imperative was to standardize production quality and increase production scale, and the cluster was helped with better infrastructures and promotion and marketing abroad. Finally, in the current globalization phase public policies are enhancing technology transfer (foreign missions), biotechnology research and the introduction of environmental controls

1. Summary on policies

1. LDCs' capabilities to design and implement policies to support local suppliers and producers are usually very weak and should be supported by international cooperation. A clear policy priority is to improve capabilities for strategic policy design, formulation, implementation in LDCs — and help explore and develop avenues for the necessary private-public collaboration.

2. Technical assistance to improve quality, sanitary and environmental standards, together with industrial standards in the country. This may be administered at the cluster level and through joint actions, and include:

- Awareness raising campaigns directed to small producers;
- Technical assistance to help local SMEs fulfil international standards requirements;
- Technical assistance to strengthen local regulatory institutions, and institutions setting environmental and sanitary standards for local producers; and
- Conditioning of the access to loans and grants on the effective implementation of standards.

3. In natural resource-based clusters, policies should foster access to scientific knowledge. Therefore, policy programs should help disseminate research to SMEs, and foster SMEs collaborations with research institutions. Specific actions may include:

- Allocation of lots in public projects for SMEs and larger growers;

- Increase availability of working and investment capital by development banks;
- Improve access to appropriate storage facilities at ports;
- Support participation in national and international fairs where SMEs; and
- Support to strengthen skills and abilities in the backward production stages along the chain.

4. Horizontal cooperation may be supported at different stages of the value chain and help remedy the often insufficient size of many local suppliers. In this sense, the cluster-level is often appropriate.

5. Encourage open dialogue, transparency, accountability and constant evaluation in the design and implementation of policies.

6. Encourage and support a dynamic and evolutionary approach to policies.

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